

REMARKS

Reconsideration of the pending application is respectfully requested on the basis of the following particulars:

Priority claim

Applicant respectfully requests the examiner to acknowledge the foreign priority claim to Malaysian application P120024308 stated in the Application Data Sheet (ADS) filed with the present application on November 17, 2003. The examiner is also requested to confirm receipt of the priority document, which is found to be included in the image file wrapper for the present application.

In the claims

Claim 9 is amended to clarify that the machine conditions include "at least cutting speed and one of depth of cut and feed rate data."

It is respectfully submitted that this amendment to claim 9 is fully supported, such as at lines 20-23 in the original specification and the first paragraph of the substitute specification.

Claim 9 is also amended to recite that the inference component includes a multilayer neural network. This limitation was previously set forth in dependent claim 11, and claim 11 is cancelled accordingly.

It is respectfully submitted that no new issues are raised by the amendments to claim 9. The examiner has identified the interpretation according to amended claim 9 as one possible interpretation of the original claim 9, and therefore there is no new issue raised. Further, the addition to claim 9 of limitations previously recited in claim 11 does not raise any new issue since this has already been considered by the examiner with respect to claim 11.

Rejection of claim 9 under 35 U.S.C. § 112, second paragraph

Claim 9 presently stands rejected as being indefinite. In particular, the examiner states that the recitation “machining conditions including at least cutting speed and depth of cut or feed rate data” can be interpreted in at least two ways.

As noted above, claim 9 is amended to clarify that the machine conditions include “at least cutting speed and one of depth of cut and feed rate data,” consistent with the examiner’s first interpretation. In view of this amendment, withdrawal of the rejection is requested.

Rejection of claims 9, 13, and 14 under 35 U.S.C. § 103(a)

Claims 9, 13, and 14 presently stand rejected as being unpatentable over Polidoro (U.S. 5,768,137) in view of Camera (U.S. 4,150,327). This rejection is respectfully traversed for at least the following reasons.

Claim 9 has been amended to recite that the inference component includes a multilayer neural network.

It is respectfully submitted that Polidoro and Camera fail to teach or suggest each and every element set forth in claim 9. Further, it is respectfully submitted that there is no motivation or suggestion for any combination or modification of Polidoro and Camera to guide a person of ordinary skill in the art to the present invention.

Polidoro does not teach input data comprising workpiece characteristic data including at least material type and hardness of the workpiece, as the examiner acknowledged in the recent Office action.

It is respectfully submitted that Camera also fails to teach or suggest input data comprising workpiece characteristic data including at least material type and hardness of the workpiece.

The examiner makes the assertion that “it is clear that the invention of Camera takes into account both the material type (e.g. ‘light alloy casting ... cast iron workpiece’

C6 L25-45) and the hardness of the workpiece caused by 'inhomogeneities such as blowholes and hard spots' C6 L25-45) for example.

Applicant disagrees. Camera provides that a "signal  $k_1$  is a constant which is *predetermined according to* the technological characteristics of the tools, the material of the workpiece to be machined and the cutting conditions, for example, *cooling and lubrication*." (Camera; col. 5, lines 6-10)(emphasis added). However, there is no teaching or suggestion that the signal  $k_1$  is a material type or a hardness of the workpiece.

Similarly, the passage of Camera cited by the examiner as teaching workpiece characteristic data including at least material type and hardness of the workpiece states that "the quantity  $k_3$  is a constant which is prefixed proportionally to the *ratio, obtained experimentally*, between the *cutting force (or torque) of a new tool* and the *cutting force (or torque) of the same tool at the end of its useful life*, that is, the limit of tool wear allowed for the cutting operation." (Camera; col. 6, lines 28-33).

In other words, the constant  $k_3$  is a measure of tool life, but is not an input of either material type or hardness of the workpiece.

While the constants  $k_1$  and  $k_3$  may bear some relationship to characteristics of a workpiece, it is clear that Camera does not provide for any input of either material type or hardness of a workpiece as set forth in the presently claimed invention.

Moreover, even assuming, *arguendo*, that material type and hardness are used in determining the constants  $k_1$  and  $k_3$ , it must be noted that both  $k_1$  and  $k_3$  are *predetermined* constants. Accordingly, there is no teaching or suggestion that material type or hardness are ever themselves inputs to Camera's system.

Therefore, Polidoro and Camera together do not disclose or suggest input data comprising workpiece characteristic data including at least material type and hardness of the workpiece.

It must be noted that Camera does not teach or suggest an inference component operative to produce fuzzy output data from fuzzy input data, wherein the fuzzy output

data comprises machining conditions including at least *cutting speed* and feed rate (at least one of cutting depth and feed rate).

On the contrary, Camera clearly and specifically notes that “the cutting speed, that is, the rotational speed of the tool 7, will be kept substantially constant, and to this aim a motor is used for rotating the tool 7 with an available power higher than that normally required, so that the motor operates in a region in which the slope of the torque-rotational speed characteristic is greater than normal. The cutting speed must not be interfered with because an optimal speed can be chosen in advance taking into account the cost of the tool and the number of workpieces to be machined, according to the well known Taylor equations.” (Camera; col. 4, lines 35-45).

Thus, Camera teaches that a cutting speed is a constant, is chosen in advance according to Taylor equations, and must not be interfered with. Thus, it does not follow that the cutting speed is a result of any inference component operative to produce fuzzy output data from fuzzy input data.

Further, Camera’s admonishment that the optimal, predetermined, constant cutting speed must not be interfered with argues against modification of Polidoro according to Camera’s teachings to arrive at the presently claimed invention where both cutting speed and at least one of cutting depth and feed rate are determined by an inference component operative to produce fuzzy output data from fuzzy input data, wherein the fuzzy output data comprises machining conditions including at least *cutting speed*.

There can be no expectation of success in applying Camera’s teachings wherein only feed speed is controlled (and which clearly and unmistakably dictate that a predetermined constant optimal cutting speed is not to be interfered with) to any system to arrive at the presently claimed invention wherein cutting speed is set as an output of an inference component operative to produce fuzzy output data from fuzzy input data, along with at least one of cutting depth and feed rate.

The prior art can be modified or combined to reject claims as prima facie obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Polidoro and Camera further fail to disclose or suggest an inference component that includes a neural network, as acknowledged by the examiner in the recent Office action.

For at least these reasons, it is respectfully submitted that Polidoro and Camera fail to form a prima facie basis for obviousness of claim 9, and therefore claims 9, along with claims 13 and 14 which depend from claim 9, are allowable over the cited references. Accordingly, withdrawal of the rejection is requested.

Rejection of claims 10-12 and 15-17 under 35 U.S.C. § 103(a)

Claims 10-12 and 15-17 presently stand rejected as being unpatentable over Polidoro and Camera in view of Yamaguchi (U.S. 6,349,293). This rejection is respectfully traversed for at least the following reasons.

As noted above, claim 9 has been amended to include the limitations previously recited in claim 11, which depended from claim 9, and claim 11 has been cancelled. Accordingly, claim 9 will be addressed along with claims 10, 12, and 15-17 in view of this rejection.

As discussed above, Polidoro and Camera fail to disclose or suggest all of the elements set forth in claim 9, since Polidoro and Camera together don't disclose or suggest input data comprising workpiece characteristic data including at least material type and hardness of the workpiece.

Further, as discussed above, Polidoro and Camera are not properly combinable to form a prima facie case of obviousness of the claimed invention, since there is no motivation or suggestion (and in particular no expectation of success) for their combination.

Moreover, it is respectfully submitted that Yamaguchi does not supplement the deficiencies found in the combination of Polidoro and Camera, since Yamaguchi does not teach or suggest input data comprising workpiece characteristic data including at least material type and hardness of the workpiece, because Yamaguchi does not provide any further motivation or suggestion for the combination of Polidoro and Camera, and because there is no motivation or suggestion for the further combination of Yamaguchi with Polidoro and Camera.

Yamaguchi does not teach or suggest input data comprising workpiece characteristic data including at least material type and hardness of the workpiece. In fact, Yamaguchi is entirely unrelated to a numerical control apparatus in a machining apparatus.

Yamaguchi is directed to a fuzzy neural network “employed for control of an Internal Combustion Engine engine control, and the candidate input data types include data relating to operation of the engine.” (Yamaguchi; col. 2, lines 47-50).

Accordingly, Yamaguchi is directed to an entirely different field than both the present invention and either of Polidoro and Camera. Yamaguchi has no teaching or suggestion whatsoever of the inputs and outputs set forth in claims 9 and 15 of the present invention, and in particular there is no teaching or suggestion of any workpiece characteristic data.

While the examiner asserts that “Yamaguchi and the combination of Polidoro and Camera are from the same field of endeavor, fuzzy logic,” and that therefore “it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined teachings of Polidoro and Camera by including a multilayer neural network,” Applicant respectfully disagrees.

It is respectfully submitted that the field of machining apparatus and the field of engine control are entirely different and unrelated. It is further submitted that a person of ordinary skill in the machining apparatus arts would not turn to engine control systems for guidance or solutions to a problem relating to the field of machining apparatus.

Further, Applicant notes that Camera is not directed to the field of fuzzy logic. As noted above, Camera is at odds with the present invention, since Camera teaches that a cutting speed is a constant, is *chosen in advance* according to Taylor equations, and *must not be interfered with*.

Thus, not only is Camera not related to fuzzy logic, Camera teaches away from the present invention. It follows that there can be no motivation or suggestion apply any inference component to produce a fuzzy cutting speed output from any fuzzy input data, since Camera's control speed is a fixed, predetermined value.

Therefore, it further follows that there is no motivation or suggestion to apply the teachings of Yamaguchi with respect to a multilayer neural network to such an inference component, since according to Camera such a computed cutting speed value.

For at least these reasons, it is respectfully submitted that Polidoro, Camera, and Yamaguchi fail to form a prima facie case of obviousness of claims 9 and 15. Accordingly, it is respectfully submitted that claims 9 and 15, along with their dependent claims 10, 12-14, 16, and 17, are allowable over the cited references, and withdrawal of the rejection is requested.

#### Conclusion

In view of the amendments to the claims, and in further view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is requested that claims 9, 10, and 12-17 be allowed and the application be passed to issue.

Application No.: 10/713,017

Examiner: B. J. Buss


Art Unit: 2129

If any issues remain that may be resolved by a telephone or facsimile communication with the Applicant's attorney, the Examiner is invited to contact the undersigned at the numbers shown.

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Date: February 20, 2007

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